SONY

Sony R&D Center
ROS Development / Activity

Oct.19th.2022
ROSCon JP 2022 @ Kyoto,Japan

Tomoya Fujita

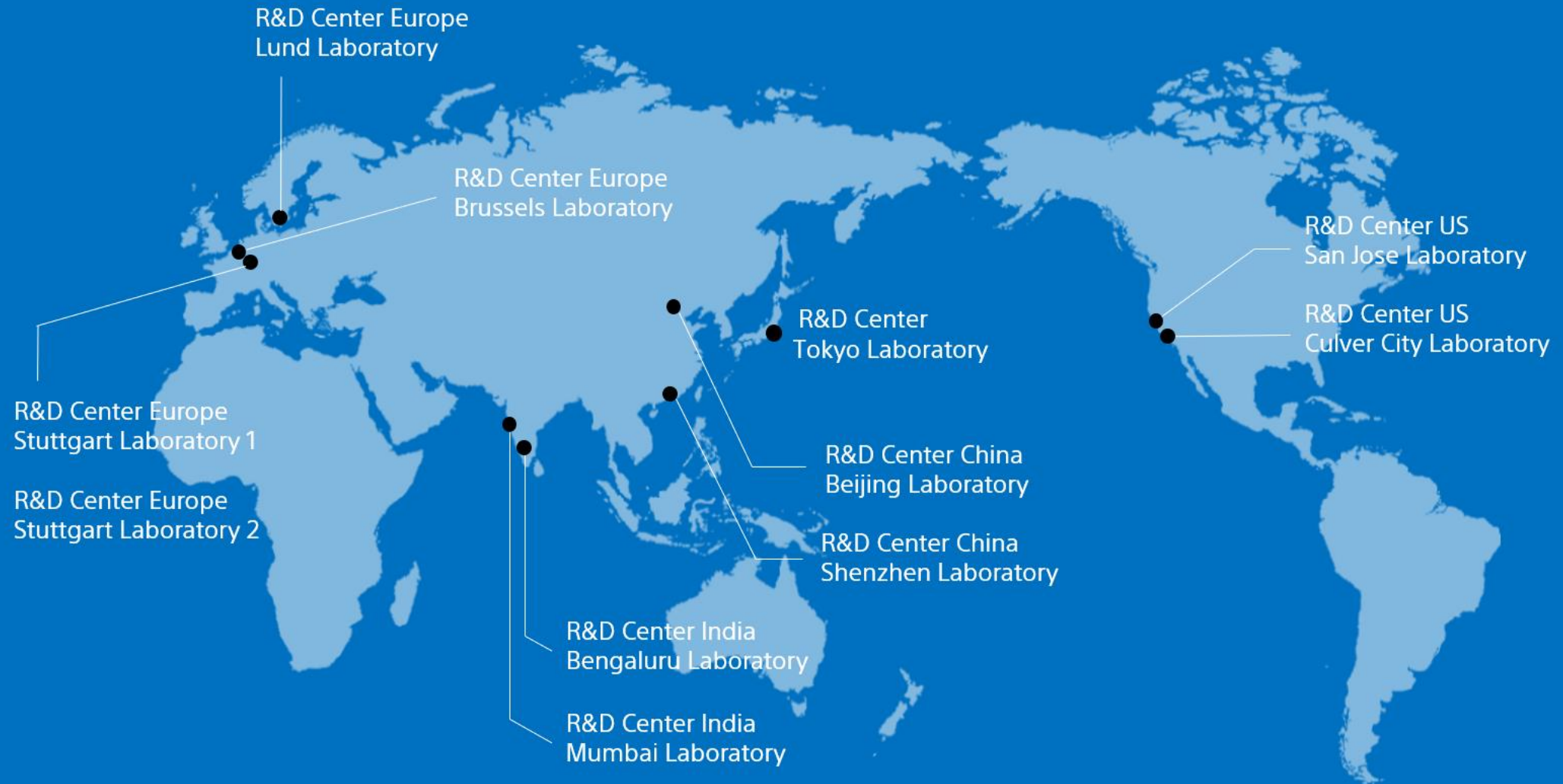R&D Center US Laboratory

Agenda

- Who am I ?
- Sony RDC Introduction
- Sony Robotics Platform
- Why Open Source?
- ROS Community
- New Feature Introduction
- What's next?

Who am I ?

- Tomoya Fujita
  - Sony R&D Center, US Laboratory
  - Senior Staff Engineer
  - ROS TSC (Technical Steering Committee)
  - fujitatomoya@github
  - tomoyafujita@linkedin

  - OSS Related Presentation / Talk
    - ROS World 2021 Content Filtered Topic
    - KubeCon EU 2021 Edge Day Robotics Edge Cluster System (ROS with Kubernetes)
    - ROS-I 2020 Asia Pacific Workshop
    - ROSCon2019 Panel Talk
    - …

Keynote Speaker
Tomoya Fujita
Software Developer at Sony Corporation

Global R&D Locations

R&D Center Europe
Lund Laboratory

R&D Center Europe
Brussels Laboratory

R&D Center Europe
Stuttgart Laboratory 1

R&D Center Europe
Stuttgart Laboratory 2

R&D Center
Tokyo Laboratory

R&D Center China
Beijing Laboratory

R&D Center China
Shenzhen Laboratory

R&D Center India
Bengaluru Laboratory

R&D Center India
Mumbai Laboratory

R&D Center US
San Jose Laboratory

R&D Center US
Culver City Laboratory

Technology Portfolio

Image
& Video

Computer
Vision & CG

Audio
& Acoustics

AI & Machine
Learning

Human
Interaction

Communi-
cation

System Arch.
& Processer

Robotics

Display
& Expression

Material
& Analysis

Sensing
Device

Life
Science
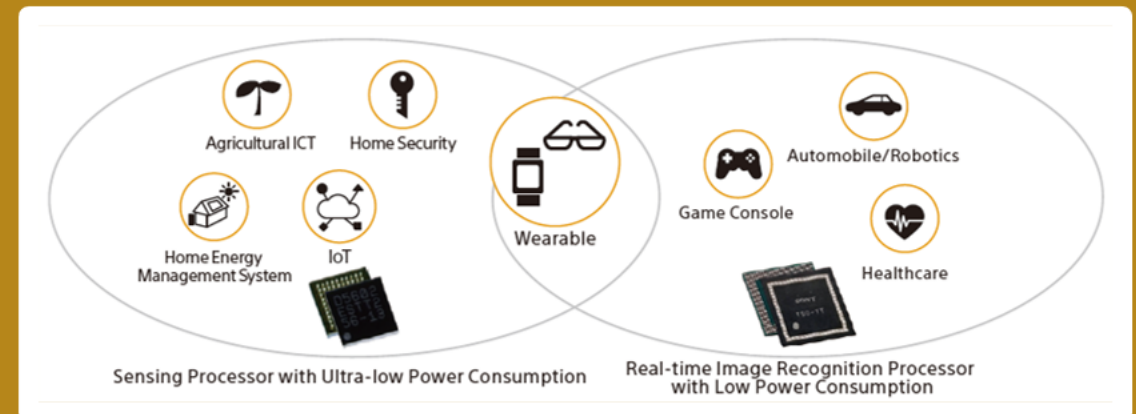
System Architecture & Processer

AI x Robotics Platform

In 2001, we were the first in the world to develop and install embedded Linux as a common OS for various AV products. We also made our software development more efficient and achieved high functionality for these products. Currently, we are expanding our focus area to system software and development environments for our AI x Robotics products. Since the AI x Robotics system software requires more advanced intelligent processing, we are developing a robotics framework that supports recognition processing and action planning.
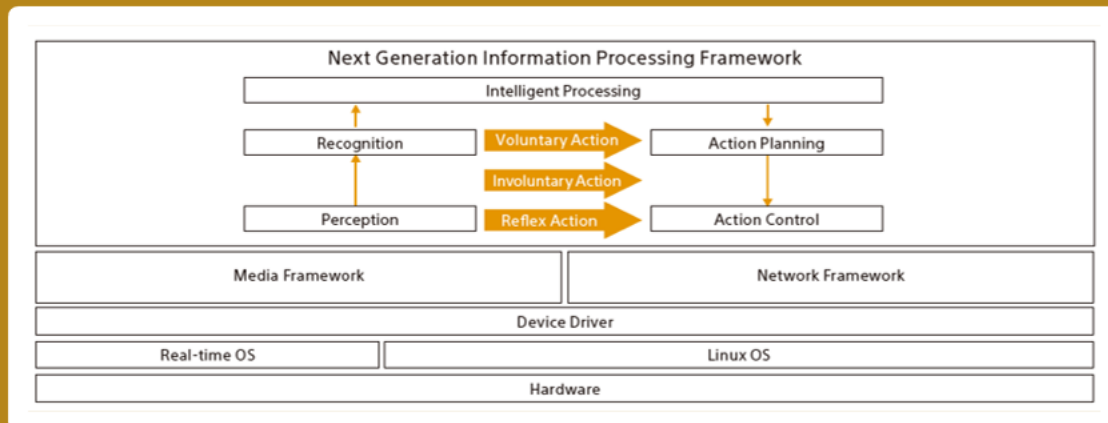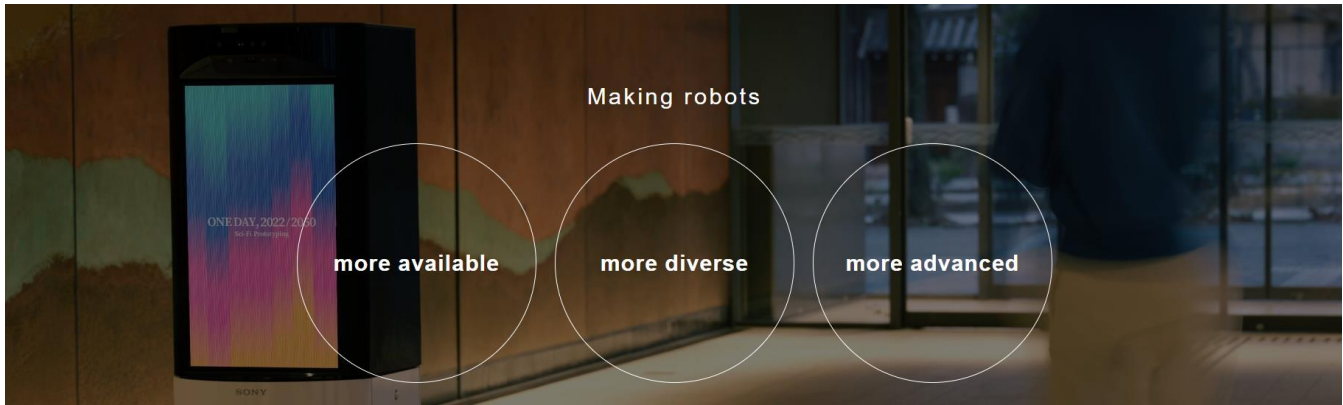

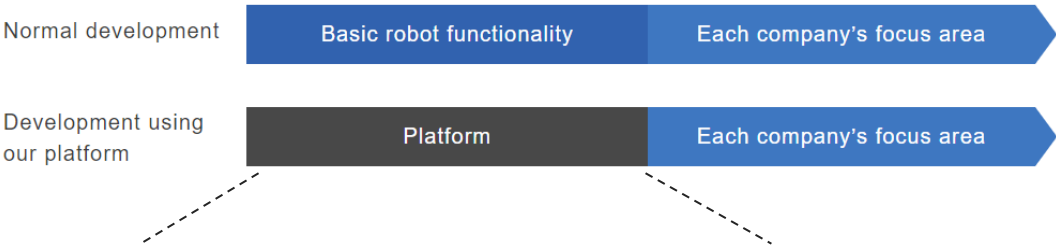## Low Power Consumption Vision / Behavior Sensing System

Sony will contribute to the wearable/ IoT society of the future through development that is consistent from processor architecture to system software and cloud applications. While developing proprietary processor cores that maximize energy efficiency, we will also develop various technologies that help make them unique. We will deliver robust environmental image recognition while covering a wide range of other functionalities and areas as well.

Introducing Sony's Robotics Platform

Making robots

more available   **more diverse**   **more advanced**

Sony's technology drives robot development for everyone

Normal development	Basic robot functionality	Each company's focus area

Development using our platform	Platform	Each company's focus area

Sony will provide ALL of our advanced robot technology

Autonomous navigation functionality
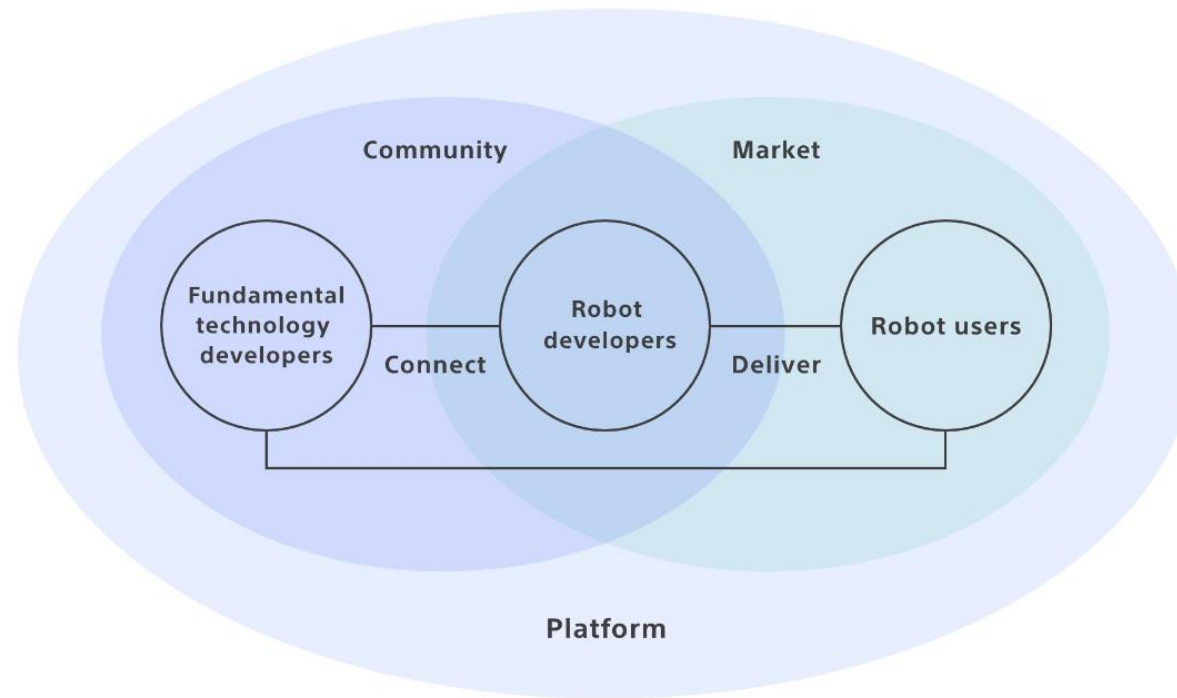
Operational tools

Autonomous tracking functionality

System state detection
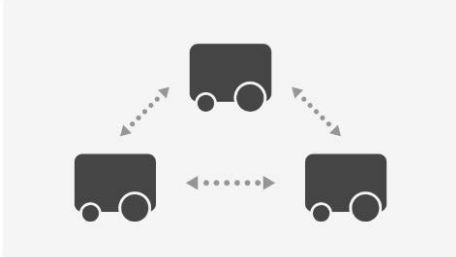
Control multiple robots

URL: https://www.sony.com/en/SonyInfo/research/projects/robotics_platform/

Introducing Sony's Robotics Platform

Create, connect, and deliver: our platform will be the future ecosystem for
the robot society
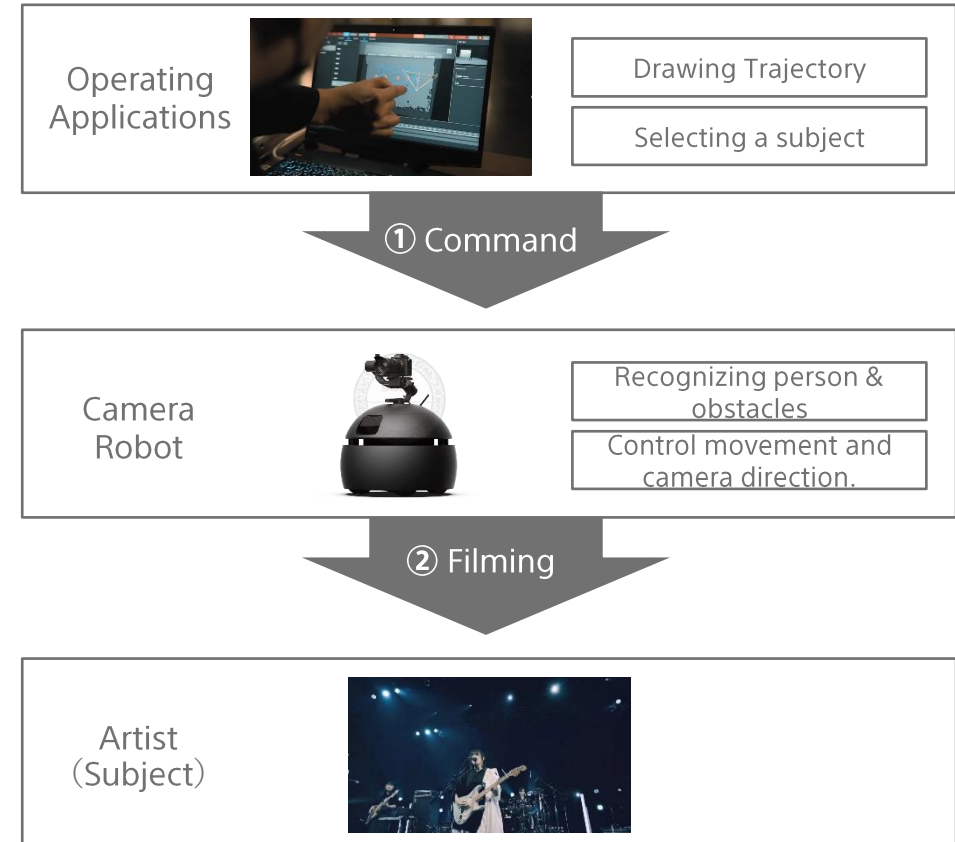

We are developing our platform based on ROS.
We are deeply grateful for the ROS community, and we would like to contribute to the community.

URL: https://www.sony.com/en/SonyInfo/research/projects/robotics_platform/

SONY

Demonstration @IROS2022

Camera Robot

| Operating Applications | Drawing Trajectory |
| | Selecting a subject |

① Command

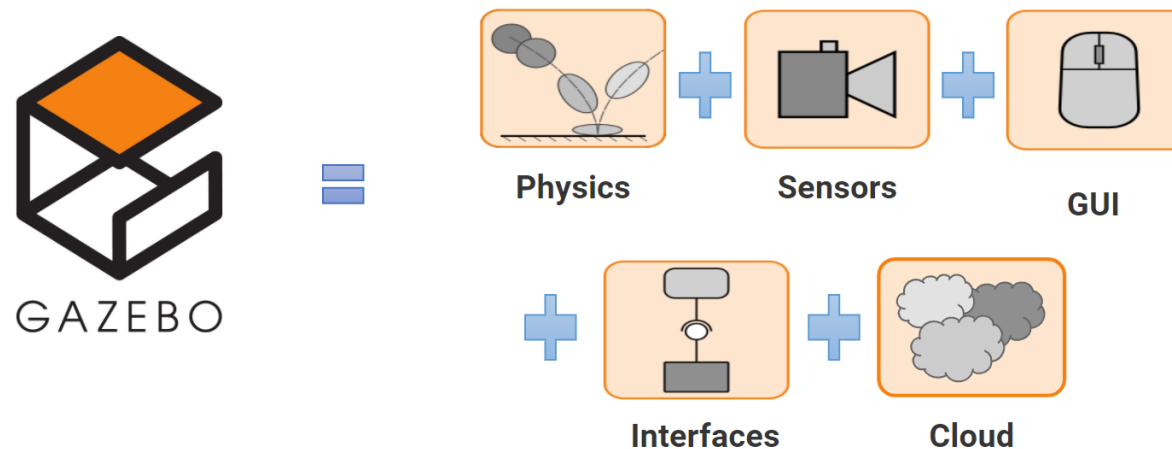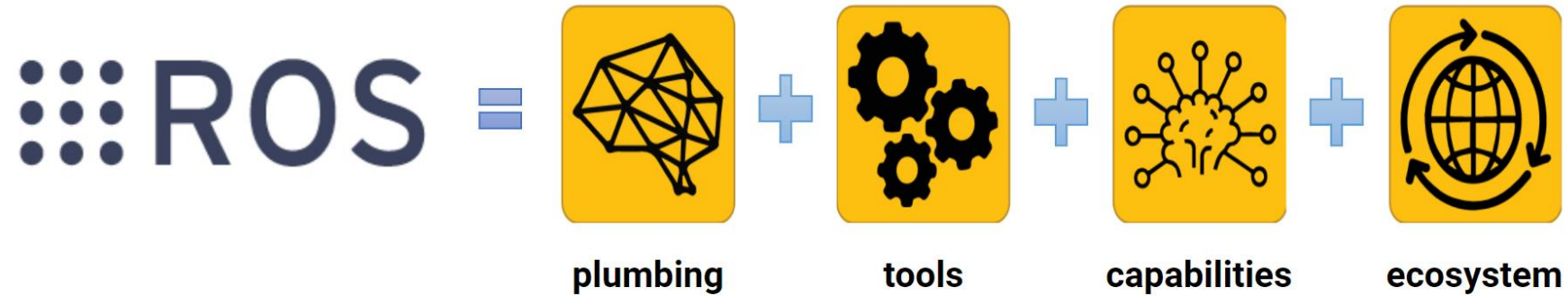| Camera Robot | Recognizing person & obstacles |
| | Control movement and camera direction. |

② Filming

Artist（Subject）

We will demonstrate "Camera Robot" utilizing our robotics platform at IROS 2022.
See you in IROS!

Why use Open Source?

- Network Effects / Feedback Circles
  - Value increases based on size of use cases
  - Bigger community, more ideas
  - Variety of experience and skills
  - API / Interface
  - Collaboration / Presence

- Open Source is the new "Standard"
  - Linux is the "standard" Operating System

- Cost Effective
  - Too much software, complexity to develop
  - 80% of software in consumer products is Open Source?
  - Only specific part of product is "differentiating"

Why use ROS?

ROS is the Eco-System for Robotics / Robots

ROS = plumbing + tools + capabilities + ecosystem

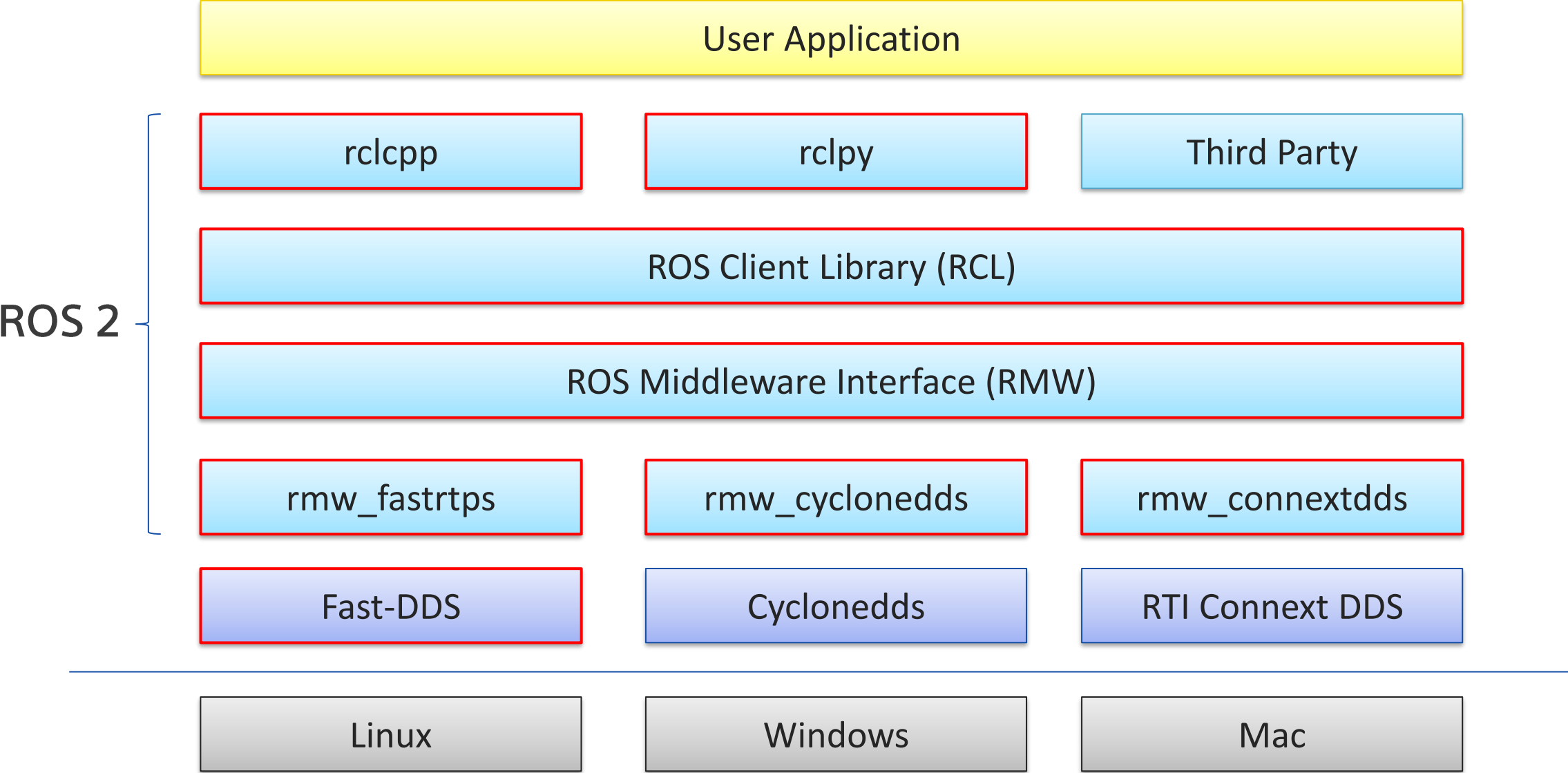GAZEBO = Physics + Sensors + GUI + Interfaces + Cloud

ROS Community

- Technical Steering Committee
    - https://docs.ros.org/en/rolling/The-ROS2-Project/Governance.html#technical-steering-committee-tsc
    - TSC comprises representatives of organizations that are contributing to the development of ROS 2

- Working Group
    - https://docs.ros.org/en/rolling/The-ROS2-Project/Governance.html#working-groups-wgs
    - WGs to discuss and make progress on specific topics.

- ROS Discourse
    - https://discourse.ros.org/
    - Discussion / Announcement / Release

- ROS answer
    - https://answers.ros.org/questions/
    - Centralized QA platform

- ROS Github
   - https://github.com/ros2 (with CI)

Let's join us !!!

- 1st, let's do it! We can always ask for the help!

- Be constructive, productive and inclusive! Let's say "we"!

- Respect, nobody works for fee. (Don't ignore feedback)

- But trust needs to be earned.

- Solve community problem, not only yours.

- Worldwide community / different culture.

Current Scope / Area

User Application

rclcpp	rclpy	Third Party

ROS Client Library (RCL)

ROS Middleware Interface (RMW)

rmw_fastrtps	rmw_cyclonedds	rmw_connextdds

ROS 2

Fast-DDS	Cyclonedds	RTI Connext DDS

Linux	Windows	Mac

ROS 2 Feature Introduction

- True Zero-Copy via eProsima Fast-DDS

    - Available Galactic or later
    - Significant performance improvement
    - Copy-Less intra/inter-process communication
    - See LoanedMessage Demo
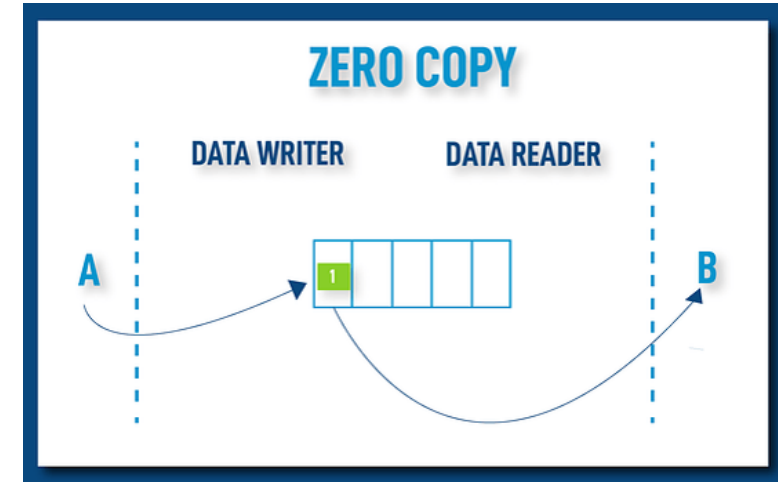
- Wait for Acknowledgements

    - Available Humble or later
    - Publisher can check if the message is delivered to reliable subscriptions
    - Use case for emergency / critical message
    - See Examples
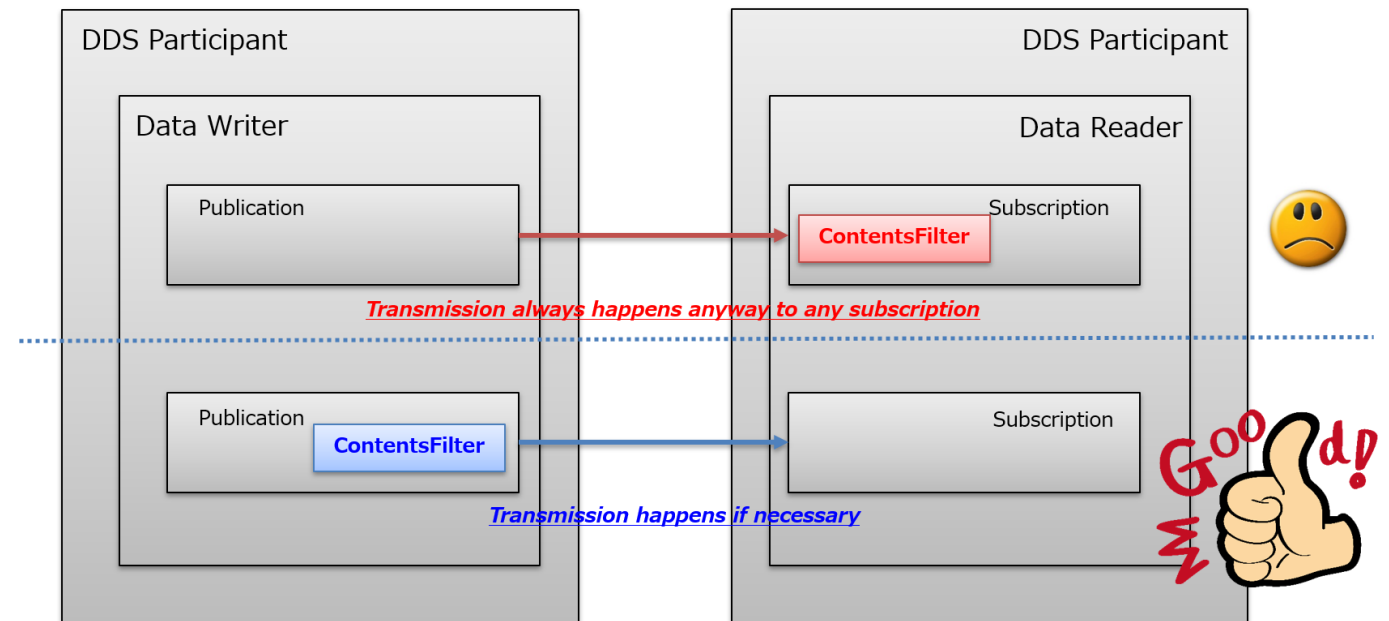
ROS 2 Feature Introduction

- Content Filtered Topic

  - Available Humble or later
  - Available on rmw_fastrtps and rmw_connextdds
  - Content-based sophisticated subscription
  - Improvement network efficiency
  - See ContentFiltering Demo

- ***Fallback Filtering W.I.P***
- ***More improvement***
  - ***Parameter Events***
  - ***Action Goal Identification***

Xu Barry

Chen Lihui

What could be missing?

- Documentation
    - Environment variables, configuration, feature usage and explanation

- rosbag2 service / action (related to [Service Introspection](#))

- Rate Control Subscription

- Zero-Copy support for unbound message type

- Capability that user application can loan the memory to middleware

- Service Load Balancing / Service Broker

SONY